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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/769,490	01/26/2001	Kenji Itoga	49657-961	5521

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EXAMINER	
KAO, CHIH CHENG G	

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 09/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/769,490	ITOGA ET AL.	
	Examiner	Art Unit	
	Chih-Cheng Glen Kao	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 August 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,11,12,24,25,27,34,35,40,42 and 50-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *50-57* is/are allowed.

6)☒ Claim(s) *1,2,4,11,12,24,25,27,34,35,40 and 42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 January 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 1, 24, 40, 42, and 54-57 are objected to because of the following informalities, which appear to be minor draft errors creating issues including grammatical and lack of antecedent basis problems.

In the following format (location of objection; suggestion for correction), the following suggestions may obviate their respective objections: (claim 1, line 6, "X-ray mirrors is output from an X-ray source"; replacing "output" with - -an outputted X-ray- -), (claim 1, lines 8-9, "the X-ray is outputted"; deleting "outputted" in line 9 and inserting - -outputted- - before "X-ray is" in line 8), (claim 1, line 9, "first angle, and"; deleting "and"), (claim 1, line 11, "the X-ray is outputted"; deleting "outputted" after "is" and inserting - -outputted- - before "X-ray is"), (claim 1, line 13; replacing "frequency" with - -wavelength- -), (claim 24, line 6, "X-ray mirrors is output from an X-ray source"; replacing "output" with - -an outputted X-ray- -), (claim 24, lines 8-9, "the X-ray is outputted"; deleting "outputted" in line 9 and inserting - -outputted- - before "X-ray is" in line 8), (claim 24, line 9, "first angle, and"; deleting "and"), (claim 24, line 11, "the X-ray is outputted"; deleting "outputted" after "is" and inserting - -outputted- - before "X-ray is"), (claim 24, line 13; replacing "frequency" with - -wavelength- -), (claim 40, line 7, "X-ray mirrors is outputted from said"; replacing "outputted" with - -an outputted X-ray- -), (claim 40, lines 10-11, "the X-ray is outputted"; deleting "outputted" in line 11 and inserting - -outputted- - before "X-ray is" in line 10), (claim 40, line 13, "the X-ray is outputted"; deleting "outputted" after "is" and inserting - -outputted- - before "X-ray is"), (claim 40, line 15; replacing

"frequency" with - -wavelength- -), (claim 42, line 11, "X-ray mirrors is outputted from said"; replacing "outputted" with - -an outputted X-ray- -), (claim 42, lines 14-15, "the X-ray is outputted"; deleting "outputted" in line 15 and inserting - -outputted- - before "X-ray is" in line 14), (claim 42, line 17, "the X-ray is outputted"; deleting "outputted" after "is" and inserting - - outputted- - before "X-ray is"), (claim 42, line 19; replacing "frequency" with - -wavelength- -), (claim 54, line 6, "L to satisfy"; replacing "L" with - -Lα- -), (claim 54, line 7; replacing "L" with - -Lα- -), (claim 54, line 8; replacing "L" with - -Lα- -), (claim 55, line 2, "second and third"; inserting a comma after "second"), (claim 55, line 6; "L to satisfy"; replacing "L" with - - Dα- -), (claim 55, line 6, "D = L x tan (2α)"; replacing "D" with - -Dα- -), (claim 55, line 11; replacing "D" with - -Dα- -), (claim 56, line 2, "third and fourth"; inserting a comma after "third"), (claim 56, line 7; "L to satisfy"; replacing "L" with - -Dα- -), (claim 56, line 7, "D = L x tan (2α)"; replacing "D" with - -Dα- -), (claim 56, line 11; replacing "D" with - -Dα- -), (claim 57, line 2, "third and fourth"; inserting a comma after "third"), and (claim 57, line 7, "Lα and Lβ"; inserting a comma after "Lα").

For purposes of examination, the claims have been treated as such. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2, 4, 24, 25, 27, 40, and 42 are rejected under 35 U.S.C. 103(a) as obvious over Watanabe (JP 10-083955) in view of Cash, Jr. (US Patent 6049588).

3. With regards to claims 1, 4, 24, and 27, Watanabe discloses an x-ray exposure apparatus and method (Title) comprising: two x-ray mirrors receiving X-rays having an angle of oblique incidence of no more than 1.5°, wherein X-rays outputted from the first and second mirrors have one angle greater than the other (Paragraph [0034] and Fig. 11, #115), a first mirror collects X-rays (Fig. 11, #113), and the second mirror increases an area of a region illuminable by X-rays (Fig. 11, #115).

However, Watanabe does not specifically disclose a mirror material, such as beryllium, having an absorption edge only in a wavelength region other than 0.45 nm through 0.7 nm, which would absorb at least 90% of an x-ray having a wavelength range less than 0.3 nm.

Cash, Jr. teaches a mirror material, such as beryllium, which would necessarily have an absorption edge only in a wavelength region other than 0.45 nm through 0.7 nm, which would absorb at least 90% of an x-ray having a wavelength range less than 0.3 nm, since these are characteristics of beryllium (col. 5, lines 37-38).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to modify the method and apparatus of Watanabe with the mirror material of Cash, Jr., since one would be motivated to incorporate this for higher reflection efficiency at low grazing angles (col. 5, lines 43-51) as shown by Cash, Jr.

4. With regards to claims 2, 25, 40, and 42, Watanabe further discloses an x-ray incidence step using a synchrotron radiation source (Abstract, "SR light").

5. Claims 11, 12, 34, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe in view of Cash, Jr. as applied to claims 1 and 24 above, and further in view of Rostoker et al. (US Patent 5374974).

Watanabe in view of Cash, Jr. suggests a device and method as recited above.

However, Watanabe does not specifically disclose an x-ray mask comprising a membrane of beryllium having an absorption edge only in either one of a wavelength region of less than 0.45 nm and a wavelength region exceeding 0.7 nm as to x-rays, and an absorber having an absorption edge in a wavelength region of at least 0.6 nm and less than 0.85 nm.

Rostoker et al. teaches an x-ray mask comprising a membrane of beryllium (col. 4, lines 65-69), which would necessarily have an absorption edge only in a wavelength region other than 0.45 nm through 0.7 nm as a characteristic of beryllium, and an absorber with a material such as tungsten, (col. 5, lines 4-10), which would necessarily have an absorption edge in a wavelength region of at least 0.6 nm and less than 0.85 nm as a characteristic of tungsten.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to modify the suggested device and method of Watanabe in view of Cash, Jr. with the mask of Rostoker et al., since it would have only involved routine skill and experimentation to discover the optimum or workable ranges of a mask in combination with a mirror for an x-ray exposure apparatus. One would be motivated to combine the mask with the mirror to insure that the intended wavelengths, which are reflected from the mirror, pass through

the mask to reach the sample, while unwanted wavelength regions are absorbed by the mask. One would also be motivated to incorporate the mask for better transparency and absorbance (col. 10, lines 12-69 to col. 11, lines 1-40) as implied from Rostoker et al.

Allowable Subject Matter

6. Claims 50-57 contain allowable subject matter.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 50 and 54, prior art does not disclose or fairly suggest an x-ray apparatus or method wherein α and $L\alpha$ are changed to satisfy a relationship $D = L\alpha \times \tan(2\alpha)$ and wherein a direction of the optical axis of an x-ray incident on a first stage x-ray mirror is substantially identical to a direction of the optical axis of an x-ray output from a second stage x-ray mirror, in combination with all the limitations in each respective claim.

Regarding claims 51, 52, 55, and 56, prior art does not disclose or fairly suggest an x-ray apparatus or method wherein α and $D\alpha$ are changed to satisfy a relationship $D\alpha = L \times \tan(2\alpha)$, in combination with all the limitations in each respective claim.

Regarding claims 53 and 57, prior art does not disclose or fairly suggest an x-ray apparatus or method wherein α, β, $L\alpha$, and $L\beta$ are changed to satisfy a relationship $D = 2 \times L\alpha \times \tan(2\alpha) = L\beta \times \tan(\beta-\alpha)$, in combination with all the limitations in each respective claim.

Response to Arguments

7. The Examiner thanks Applicants for noting the omission of JP 10-83955 on the PTO-892 form dated March 27, 2003. The Examiner has listed JP 10-83955 in the PTO-892 enclosed herein.

8. Objections to the specification and claims as well as rejections to claims 39 and 50-53 under the second paragraph of 35 USC 112, made of record on April 13, 2004, have been withdrawn in light of the amendment and arguments filed August 12, 2004.

9. Applicant's arguments with respect to claims 1, 2, 4, 11, 12, 24, 25, 27, 34, 40, and 42 have been considered but are moot in view of the new ground(s) of rejection.

10. Applicant's arguments filed August 12, 2004, have been fully considered but they are not persuasive.

Regarding claims 1, 2, 4, 11, 12, 24, 25, 27, 34, 35, 40, and 42, Applicant submits that neither Watanabe nor Cash, Jr., either alone or in combination, teach or suggest the two X-ray mirrors absorbing at least 90% of an x-ray having a wavelength range less than 0.3 nm. The Examiner disagrees for the following reason. Modifying the apparatus of Watanabe with the Beryllium mirrors of Cash, Jr. would necessarily have mirrors absorbing at least 90% of an x-ray having a wavelength range less than 0.3 nm, since this property is characteristic of Beryllium. Therefore, the claims remain rejected as being unpatentable.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gk

DAVID V. BRUCE
PRIMARY EXAMINER